Rejuvenating agent, virgin aggregate, and plant-produced asphaltic concrete shall be added as individual components of the recycled mixture as required in the mix design analysis. Include this cost in the unit bid price per square yard (meter). Bituminous materials for tack coat applied and accepted will be measured as outlined in Section 109.

### 403.4.01 Limits

General Provisions 101 through 150.

## 403.5 Payment

Hot in-place recycled asphaltic concrete is paid for at the contract unit price per square yard (meter). Payment is full compensation for furnishing all materials, all equipment, Work, and labor. Payment also includes removal of raised pavement markers and thermoplastic striping, if applicable, heating and hot-milling, adding rejuvenator, performing the mix design, performing project sampling and testing, and other incidentals necessary to complete the work. Aggregate and hot mix asphaltic concrete which may be added to meet requirements of the mix design analysis shall be included in the contract unit price.

Bituminous tack coat is paid for per gallon (liter) under separate payment. Hot mix asphaltic concrete specified for overlaying, if any, will be paid for under separate payment. Aggregate specified in the contract, if any, (excluding that required based on the mix design analysis) will be paid for under separate payment.

Payment will be made under:

| | | |
|---|---|---|
| Item No. 403 | Hot in-place recycled asphaltic concrete | Per square yard (meter) |
| Item No. 403 | Hot in-place recycled asphaltic concrete including polymer-modifier | Per square yard (meter) |

### 403.5.01 Adjustments

General Provisions 101 through 150.

# Section 405—Hot Asphalt-Vulcanized Rubber Seal Treatment

## 405.1 General Description

This work includes placing a hot asphalt–vulcanized rubber seal treatment on an existing pavement surface according to the Specifications.

### 405.1.01 Definitions

General Provisions 101 through 150.

### 405.1.02 Related References

**A. Standard Specifications**

Section 413—Bituminous Tack Coat

Section 424—Bituminous Surface Treatment

Section 800—Coarse Aggregate

Section 820—Asphalt Cement

**B. Referenced Documents**

General Provisions 101 through 150.

### 405.1.03 Submittals

General Provisions 101 through 150.

## 405.2 Materials

**A. Asphalt Cement**

Before adding rubber and diluent, ensure that the asphalt cement conforms to Section 820.2.01, PG 58-22.

**B. Ground Vulcanized Tire Rubber**

Ensure that the ground vulcanized tire rubber meets the following requirements:

| Sieve Size | Maximum Percent Passing by Weight |
|---|---|
| No. 8 (2.36 mm) | 100 |
| No. 10 (2.0 mm) | 98 |
| No. 40 (425 µm) | 10 |

Ensure that the granulated rubber has the following characteristics:

- A specific gravity of 1.17 ± 0.03
- No more than a trace of fabric
- Free of wire or other contaminating materials

  An exception is that up to four percent of calcium carbonate may be included to prevent the particles from sticking together.
- Fully vulcanized

**C. Diluent**

For diluent, use kerosene with a boiling point above 350 ºF (175 ºC).

**D. Cover Aggregate**

Ensure that cover aggregate conforms to Section 800, Class "A," Group II.

Ensure that gradation of the cover aggregate meets Section 800 for No. 7 stone.

Preheat the cover aggregate to 290 ºF to 350 ºF (140 ºC to 175 ºC) and precoat with a maximum of 0.75 percent of performance grade PG 58-22 described in Section 820. See Subsection 405.3.05.A, "Mixing."

### 405.2.01 Delivery, Storage, and Handling

General Provisions 101 through 150.

## 405.3 Construction Requirements

### 405.3.01 Personnel

General Provisions 101 through 150.

### 405.3.02 Equipment

Ensure that equipment conforms to Section 424 and the following:

**A. Canvas Cover**

If directed by the Engineer, cover exposed material with canvas to help prevent the temperature of exposed material from dropping. See Subsection 405.3.05.A, "Mixing."

**B. Aggregate Spreader**

Use an adjustable, self-propelled aggregate spreader to accurately spread the amounts given in the Plans per square yard (meter).

**C. Rubber Tire Rollers**

Use at least three rubber tire rollers loaded to 5,000 lbs (2275 kg) per tire. Inflate tires to 100 psi (700 kPa).

### 405.3.03 Preparation

**A. Spread the Asphalt-Rubber Composition**

Before applying the hot asphalt-rubber composition, clean and patch the existing pavement surface and treat with a bituminous tack coat as specified in Section 413.

**B. Test the Distributor Trucks**

Before spreading the asphalt-rubber composition, test distributor trucks for transverse spread within the previous 6 months. Prove to the Engineer that each transverse spread was as uniform as possible and variance was never greater than 15 percent.

**NOTE: A transverse spread for other asphalt products will not be accepted. The rate of transverse spread will be determined according to the requirements of the Georgia tentative test method.**

### 405.3.04 Fabrication

General Provisions 101 through 150.

### 405.3.05 Construction

**A. Mixing**

Mix asphalt and rubber as follows:

1. Before adding the rubber, ensure that the temperature of the asphalt is no higher than 325 °F (160 °C) for PG 58-22.
2. Rapidly combine the rubber with the asphalt. Mix the rubber until the material approaches a semi-fluid consistency. Ensure that the weight proportions of the two materials are as follows:

| | |
|---|---|
| Asphalt | 75 ± 2% |
| Rubber | 25 ± 2% |

3. Mix the hot asphalt and rubber for at least 5 minutes.

**NOTE 1: Design the rubber and asphalt combination method to ensure that the Engineer can determine the percentages by weight of each component to be mixed.**

**Ensure that the mixing equipment can produce a homogenous mixture of rubber and asphalt to prevent separation.**

**NOTE 2: Preheating, precoating, and covering aggregate with canvas may be waived if proper facilities are not available and if application conditions are favorable. Precoating is often used for dust control.**

4. After the asphalt and rubber have reacted fully, add a diluent to:
   - Temporarily reduce the viscosity of the mixture
   - Improve the spraying action from the distributor
   - Provide a better coating of cover aggregate

   The diluent amount is 5.5 percent to 7.5 percent, by volume, of the hot asphalt-rubber composition. When adding the diluent, ensure that the temperature of the hot asphalt-rubber composition does not exceed 350 °F (175 °C).

**B. Spreading**

Spread the asphalt-rubber mixture as follows:

1. When the proper consistency is reached, immediately begin application. Never hold the mixture at temperatures over 325 °F (160 °C) for more than 1.5 hours after reaching application consistency.
2. Use the following application rates:
   a. In areas where temperatures remain above 20 °F (–7 °C) during the winter season, apply the hot asphalt-rubber mixture at 0.55 gallons/yd², ± 0.03 gallons/yd² (2.5 liters/m², ± 0.15 liters/m²).
   b. In areas where temperatures drop below 20 °F (-7 °C); apply the mixture at 0.60 gal/yd², ± 0.03 gal/yd² (2.7liters/m², ±0.15 liters/m²) unless otherwise specified by the Engineer.

   Application rates are based on 7.5 lbs/gal (0.90 kg/L), hot, and conversions to the standard 60 °F (15 °C) are not necessary.

**NOTE: Place the hot asphalt-rubber mixture only when the ambient temperature is 60 °F (15 °C) or above and rising.**

3. Apply the cover aggregate at 25 to 40 lbs/yd² (14 to 22 kg/m²), which is 25 to 27 lbs (14 to 15 kg) for No. 7 stone and 35 to 39 lbs(19 to 21 kg) for No. 8 stone, or as directed by the Engineer.
4. Perform at least four complete coverages with the pneumatic rollers. Roll the cover aggregate immediately after application to ensure maximum aggregate embedment.

   Do not permit traffic on the completed surface until approved by the Engineer.
5. If heavy or high-speed traffic may displace the cover aggregate, apply 5 to 10 lbs/yd² (2.5 to 5.0 kg/m²) of sand after rolling and before opening the lane to traffic as directed.
6. Sweep the joint edges clean of overlapping cover aggregate before applying the adjacent asphalt–rubber material.
7. Avoid skips and overlaps at joints and protect the surfaces of adjacent structures from being spattered or marred. These defects will be corrected at the Contractor's expense.
8. Make transverse joints as follows:
   a. Place building paper over the ends of the previous applications.
   b. Start the adjoining application on the building paper.
   c. Remove and dispose of the paper to the Engineer's satisfaction.
9. In urban areas, remove excess chips within 24 hours after placing. Do not use gutter brooms or steel-tined brooms, and do not disturb the loose chips from parkways, sidewalks, and intersecting streets.

   Continue this operation until excess or loose rock is removed from the roadway surface and abutting Rights-of-Way.
10. If needed, apply a flush coat to areas without substantial traffic at the Engineer's direction. Apply light sanding after flushing to prevent pickup, if required.

#### 405.3.06 Quality Acceptance

General Provisions 101 through 150.

#### 405.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

### 405.4 Measurement

The quantity to be measured is the number of square yards (meters) of seal treatment completed and accepted. The length is measured along the surface. The width is specified on the Plans, plus or minus any authorized changes. Irregular areas are measured by the surface square yards (meters) within the lines shown on the Plans or authorized changes.

#### 405.4.01 Limits

General Provisions 101 through 150.

### 405.5 Payment

The accepted quantity of seal treatment is paid for at the Contract Unit Price per square yard (meter). Payment is full compensation for providing materials, hauling, mixing, spreading, rolling, and performing any other work to complete the Item.

Payment will be made under:

| | | |
|---|---|---|
| Item No. 405 | Hot asphalt vulcanized rubber seal treatment | Per square yard (meter) |

#### 405.5.01 Adjustments

General Provisions 101 through 150.

## Section 406—Coal Tar Emulsion Seal Coat

### 406.1 General Description

Specifications for this work will be included elsewhere in the Contract.